STATKRAFT

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED DERNACART WIND FARM, COUNTY LAOIS

VOLUME 2 – MAIN EIAR

CHAPTER 4 - DESCRIPTION OF THE PROPOSED DEVELOPMENT

DECEMBER 2019

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4 DESCRIPTION OF THE PROPOSED DEVELOPMENT

4.1 Introduction and Background

This section of the EIAR describes the existing site and the main components of the proposed development and provides details on the construction, operation and decommissioning of the wind farm.

Statkraft proposes to develop the Dernacart Wind Farm in Co. Laois. It is proposed to supply the power from Dernacart Wind Farm to the Irish electricity network via underground cable to the proposed substation at Bracklone, Co. Laois.

4.2 Existing Environment

The proposed wind farm site includes lands in the townlands of Forest Upper, Forest Lower and Dernacart, and is approximately 49ha in size. The site is accessed from the N80 and the site entrance is located on the L2092.

The site of the proposed development is located in relatively low-lying lands below the 80m contour level. The landcover is classified on Corine as pastures, peat bog and coniferous forest. This is illustrated in Figure 4.1. A tributary of the River Barrow flows through the site and to the east of the site is another tributary of the River Barrow. A bog is located to the north and east of the site and to the south and west are agricultural lands.

The proposed grid connection which will connect the on-site substation to the proposed Bracklone substation is ca. 16.5km in length and runs predominantly along existing roads.

Within 1km of the proposed turbines there are 29 no. residential receptors and 1 no. commercial receptor, - this information is based on a house survey. The closest occupied dwelling (with the exception of involved landowners) is over 740m from the nearest proposed turbine location.

4.3 Land Ownership

Confirmation of landowner consent to make this application for planning permission is contained in Appendix 4.1 of Volume 3 of this EAR. Planning permission is sought for the development as described in section 4.6.

4.4 On-Site Wind Resource

More traditional, elevated coastal areas which have typically been associated with wind energy development are becoming less available for wind energy development for a number of reasons including restrictions associated with environmental designated areas, visually protected areas etc. In addition to this, due to improvements in wind turbines technology, it is now feasible to develop commercial scale wind farms in lower lying areas with lower wind speeds, areas which were not previously considered economically viable for commercial wind farm development in Ireland. In particular, larger rotors and bigger swept areas have opened up lands in areas such as the midlands of Ireland for wind farm development.

The layout of the proposed wind farm development has been designed to minimise the potential environmental impacts of the wind farm, while at the same time maximising the energy yields of the wind resource passing over the site. Available wind speed is a key factor in determining the economic viability of potential wind energy locations. In 2003 the Sustainable Energy Authority of Ireland (SEAI) produced a Wind Atlas with information on wind speed modelled at 50m, 75m and 100m height above the ground. With turbine technology innovation, turbine models can now capture more of the wind current and have bigger rotors that radically change the economic viability of wind power. This has been reflected in the updated SEAI 2013 Wind Atlas which re-modelled wind speed data for a much wider range of 30m-150m height above ground level. The 2013 SEAI Wind Speed Atlas identifies the site as having a wind speed of between 7.25 – 7.5 m/s and 7.5 - 7.75 m/s at 75m above ground level.

Path: R:\Map Production\2018\P1892\Workspace\EIAR\Chapter 4 - Description of the Proposed Development\P1892_Fig4-1_CORINELandCover_A3.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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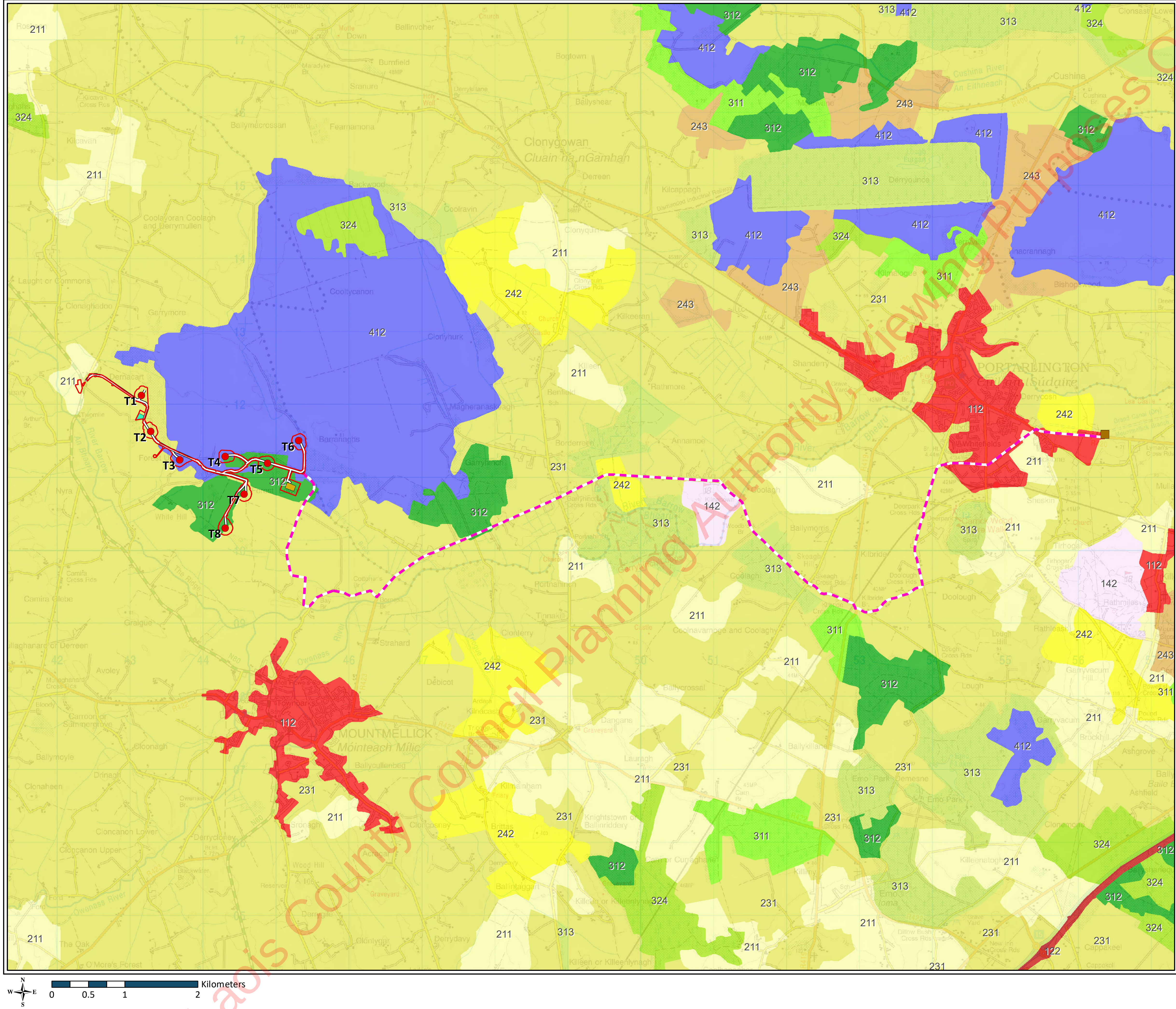

- Proposed Turbines
- Proposed Future Bracklone Substation
- Proposed Planning Boundary
- Proposed Access Tracks
- Proposed Cable Route
- Proposed Substation
- Proposed Temporary Compound

CORINE Land Cover 2018

- 112 Discontinuous urban fabric
- 122 Road and rail networks
- 131 Mineral extraction sites
- 142 Sport and leisure facilities
- 211 Non-irrigated land
- 231 Pastures
- 242 Complex cultivation patterns
- 243 Land principally occupied by agriculture with areas of natural vegetation
- 311 Broad-leaved forest
- 312 Coniferous forest
- 313 Mixed forest
- 324 Transitional woodland scrub
- 412 Peat bogs

TITLE: CORINE Land Cover	
PROJECT: Dernacart Wind Farm	
FIGURE NO: 4.1	
CLIENT: Statkraft	
SCALE: 1:50000	**REVISION:** 0
DATE: 29/01/2020	**PAGE SIZE:** A3

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4.5 Proposed Development

Statkraft is proposing to construct an up to eight-turbine wind farm at Dernacart, Co. Laois. The wind farm will be connected by a 110kV underground cable to the proposed Bracklone substation. The proposed development will consist of the following infrastructure:

- Erection of up to 8 no. wind turbines with an overall tip height of up to 185m
- Construction of foundations and hardstanding areas in respect of each turbine
- Construction of 1 no. site entrance from the public road
- Construction of ca. 5.8km of new site access tracks and associated drainage
- Upgrade of ca.0.89km of existing access tracks and, where required, upgrade of associated drainage
- Establishment of 1no. temporary compound and associated parking areas
- Construction of drainage and sediment control systems
- Construction of 1 no. electricity substation including:
    - 2 no. control buildings containing worker welfare facilities
    - Electrical infrastructure and grid ancillary services equipment
    - Parking
    - Fencing
    - Waste water holding tank
    - Equipment storage
    - Wind farm communications equipment
    - All associated infrastructure, services and site works including landscaping
- Installation of underground electricity cables between the proposed turbines and proposed on-site substation.
- Temporary alterations to the public road at identified locations to accommodate the delivery of turbines
- Associated site works including berms and landscaping
- Tree felling
- Peat excavation
- Installation of a permanent meteorological mast of up to 110m in height
- A 10-year planning permission is sought with a 30 year operational life from the date of commissioning of the entire wind farm.

The grid connection between the on-site substation and the future proposed Bracklone substation does not form part of the planning application, however, the likely impacts of the construction and operation of this grid connection are included as part of this EIAR.

The construction period for the wind farm is estimated to be 12 months.

4.5.1 Turbine Layout

The layout of the proposed wind farm has been designed to minimise the potential environmental effects of the wind farm while at the same tie maximising the energy yield of the wind resource passing over the site. Figure 4.2 shows the proposed development layout. The layout reflects the outcome of the iterative design process. Further detail on the design philosophy, constraints and alternative layouts is detailed in Chapter 2 Need and Alternatives of the EIAR.

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Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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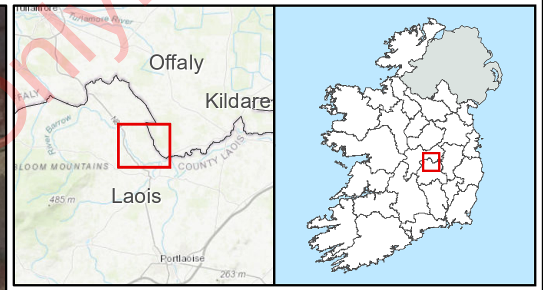

Proposed Turbines
Proposed Met Mast
Proposed Planning Boundary
Study Area Boundary
Proposed Cable Route
Proposed Turbine Hardstanding Areas
Proposed Substation
Proposed Temporary Compound

Proposed Access Tracks

Existing Track to be Upgraded
New Track

TITLE: Proposed Wind Farm Layout	
PROJECT: Dernacart Wind Farm	
FIGURE NO: 4.2	
CLIENT: Statkraft	
SCALE: 1:17500	**REVISION:** 0
DATE: 31/01/2020	**PAGE SIZE:** A3

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N W E S
0 0.25 0.5 1 Kilometers

The turbines T1 to T8 and their associated co-ordinates in Irish Transverse Mercator (ITM) are detailed in Table 4.1.

Table 4-1: Co-ordinates of Proposed Turbine Locations

ID	X_ITM	Y_ITM
T1	643101.4	712155.1
T2	643230.1	711660.2
T3	643625.5	711270.5
T4	644247.8	711316.2
T5	644828.6	711222.1
T6	645257.9	711533.2
T7	644510	710800.8
T8	644252.1	710336

4.5.2 Power Output

The exact model of turbine is not known at present. Turbines of the exact same make, model and dimensions can have different power outputs depending on the capacity of the electrical generator installed in the turbine nacelle.

A rated output of 5MW (which is the typical output of a turbine of the proposed envelope) has been used to calculate the estimated power output of the proposed wind farm, which results in an estimated installed capacity of 40MW. Assuming an installed capacity of 40MW, the proposed wind farm has the potential to produce up to 122,640MWh (megawatt hours) of electricity per year, based on the following calculation:

A x B x C = Megawatt Hours of electricity produced per year

where:

A = The number of hours in a year: 8,760 hours

B = The capacity factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc. A capacity factor of 35% is applied here

C = Rated output of the wind farm: 40MW

The 122,640 MWh of electricity would be sufficient to supply the equivalent of approximately 29,000 Irish households with electricity per year, based on the average Irish household using 4,200 MWh of electricity per year (this latest figure is available from the March 2017 CER Review of Typical Consumption Figures - Decision Paper).

The 2016 Census of Ireland recorded a total of 84,697 households in Co. Laois. Per annum, based on a capacity factor of 35%, the proposed wind farm would therefore produce enough electricity for the equivalent of just over 34% of all households in Co. Laois.

EirGrid in their All Island Generation Capacity Statement (2017-2026) estimates a capacity factor of approximately 31% for onshore wind. The 35% capacity factor applied for the proposed development is greater than the EirGrid estimation as a result of the turbine type proposed for the site i.e. tall turbines (tip height of up 185m) with greater rotor diameters. This turbine type allows for the use of fewer, taller turbines with an increased efficiency.

4.5.3 Turbines

The proposed turbines will have a tip height of up to 185m. Detailed drawings, which accompany the planning application, show a typical turbine that may be used for the proposed development, however, the exact make and model of the turbine will be dictated by a competitive tender process of the various turbines on the market at the time, but will not exceed the maximum size envelope set out within the development description (i.e. tip height up to 185m).

Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics with only minor cosmetic details differentiating one from another.

The wind turbines that will be installed on site will be conventional three-blade turbines, geared to ensure that the rotors of all turbines rotate in the same direction at all times. Each discipline within the EIAR have assessed various types and sizes of turbines within the 185m tip height envelope based on the worst-case scenario. The exact combination of rotor diameter and hub height will be dictated by the final selection of the turbine make and model at turbine selection stage/pre-construction. At this stage new turbine models or variants may be available that were not on the market at the pre-planning / EIAR stage, but which would better suit the site and fit within the turbine envelope. Should this circumstance arise the specific parameters of the new turbines will be assessed for their compliance with the criteria set out and considered in this EIAR, to make sure that the overall conclusions of the EIAR remain valid.

The turbine will be of the generic three bladed, tubular tower model with horizontal axis. The rotor blades are bolted to the central hub, which is connected to a gearbox located in the nacelle. The nacelle holds the following turbine components:

- Generator
- Electrical components
- Control unit
- Aviation lighting to IAA specifications

The Wind Energy Development Guidelines (2006) are currently the subject of a targeted review. Should the revised Wind Energy Guidelines be finalised in advance of a planning decision being made on the proposed development with current noise and shadow flicker limits being amended, the proposed development will comply with revised noise and shadow flicker requirements by implementing any necessary mitigation through the use of turbine control systems. Further to this the proposed layout has sought to achieve a high level of separation between dwellings and turbines by providing a minimum separation distance of ca. 740m.

4.5.3.1 Turbine Blades

The blades of a modern turbine are typically made up of glass fibre reinforced polyester. They typically turn at between 3 and 22 revolutions per minute depending on wind speed and make of turbine.

A typical turbine begins generating electricity at a wind speed of 2 - 4m/s depending on turbine type, with rated power generation achieved at wind speeds of approximately 9 - 16m/s.

The turbines usually shut down at wind speeds greater than 25m/s, although some machines are designed to operate at up to 30m/s. A yaw machine mechanism is used to turn the nacelle and blades into and out of the wind. A wind vane on the nacelle controls the yaw mechanism. Blades are pitched to match the wind conditions.

4.5.3.2 Turbine Tower

The tower of the turbine is a conical steel tube, with multiple paint finish. It is generally delivered to site in four or five sections. The first section is bolted to the steel base, which is cast into the concrete foundation.

The shape and size of the foundation can vary depending on the turbine manufacturer however it is approximately 20m (width and length) and approximately 2m in depth. The upper sections of the tower are bolted to the lower ones in sequence.

The base of the tower is typically around 4-5m in diameter, tapering to approximately 2-3m, where it is attached to the nacelle. The first floor of the tower is approximately 2-3m above ground level it is accessed by a galvanised steel staircase and a steel hatch door which will be kept locked except during maintenance. The exact details of the turbine tower will be dictated by final selection of the turbine make and model.

4.5.4 Turbine Transformer

The turbine will generate electricity at approximately 660 volts, depending on the machine chosen. The turbine will have a transformer located within the tower or in the turbine nacelle. The transformer will step up the voltage to approximately 33kV to reduce the electrical losses in the cabling connector circuits that connect to the site substation.

4.5.4.1 Turbine Colour

The turbines have multiple coatings of paint to protect against corrosion. They will have an off-white to light grey colour to blend into the sky background. This minimises visual impact, as recommended by the following guidelines on wind energy development:

- "Wind Energy Development – Planning Guidelines" (2006), Department of the Environment, Heritage and Local Government
- "The Influence of Colour on the Aesthetics of Wind Turbine Generators", ETSU W/14/00533/00/00
- PAN 45, The Scottish Office Environment Department
- PPG22, Department of the Environment - Welsh Office
- Technical Advice Note 8, Welsh Assembly, 2005

4.5.5 Turbine Delivery Route, Access Tracks and Hardstanding

4.5.5.1 Turbine Delivery Route

Turbine components deliveries are likely to be routed from Dublin Port to the M6, where they will travel to Junction 5. At Junction 5, the deliveries will exit the motorway and travel south along the N52 through the Ardan, Cappincur, Cloncollig and Clonminch roundabouts. At the Clonminch roundabout, the deliveries will travel along the N80 through Killeigh to the site entrance at Dernacart. The final turbine delivery port and delivery route will be subject to agreement with the turbine manufacturer and with the planning authority.

At the junction between the N80 and the local road leading to the site entrance, adjacent lands are required for the turbine delivery truck to turn onto the local road. These lands are contained within the red line planning boundary. It is proposed to use a blade adaptor to minimise the land required at this location. The blade adaptor is capable of raising the blade from its horizontal position to a vertical position thus reducing the swept path/length of the load and reducing the requirements for hedge trimming/land takes etc. The blade is connected to a specially adapted motorised unit and tilted up to 60 degrees into the air and transported through the restricted area. The tilting of the blade reduces the length and thus a reduced area of land is required for the transportation of the blade.

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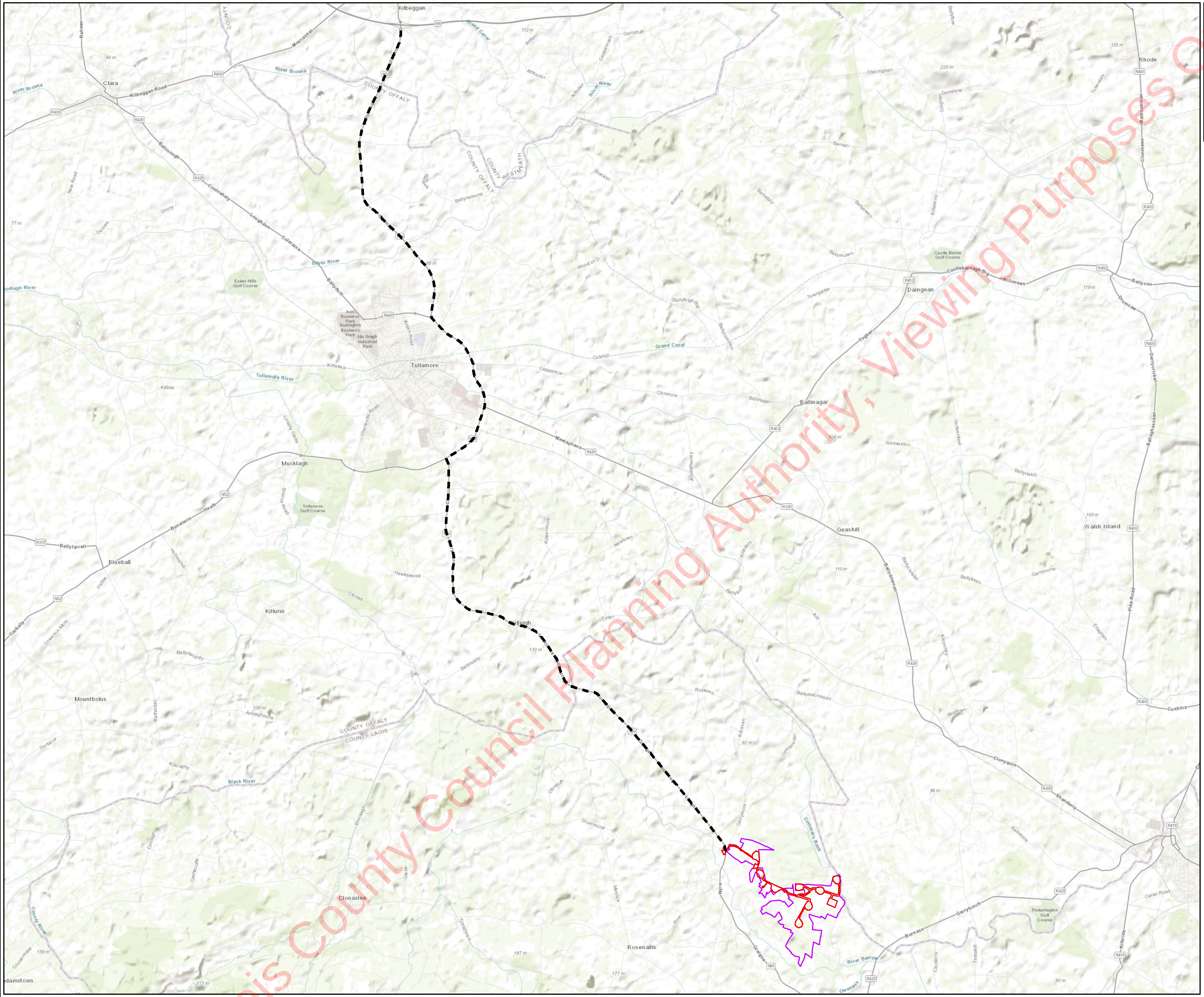

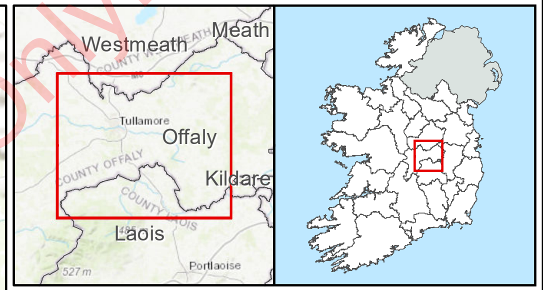

Proposed Turbine Delivery Route

Proposed Planning Boundary

Study Area Boundary

Kilometers
0 1 2 4

TITLE: Turbine Delivery Route	
PROJECT: Dernacart Wind Farm	
FIGURE NO: 4.3	
CLIENT: Statkraft	
SCALE: 1:100000	**REVISION:** 0
DATE: 29/01/2020	**PAGE SIZE:** A3

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4.5.5.2 Internal Access Tracks

Within the site, approximately 890m of internal access tracks will be upgraded and c. 5.8km of new internal access tracks will be constructed as part of the development. Figure 4.4 illustrates the internal access tracks within the proposed development site. This track layout will facilitate site access for delivery and construction vehicles during the construction phase, for maintenance activities during the operational phase and for vehicles required to complete the decommissioning of the turbines at the end of the life of the development. Existing access tracks have been utilised where possible for the proposed development.

All access tracks will be approximately 4.5-5.5m wide along straight sections and wider at bends and as required. The tracks will be finished with a well graded aggregate. A drainage system will be installed adjacent to the internal access tracks.

There may be a requirement following detailed design for floating roads. Floating roads are constructed without excavating the existing ground. They will consist of a layer of combined geotextile and geogrid laid directly on the existing surface. Layers of stone will then be placed on top with additional geogrid reinforcement as required. A layer of compacted Cl 804 material will be placed on top to provide a suitable running surface. Floating roads will generally be constructed where the depth of peat / soft clay is in excess of 1m or as other site conditions dictate. Detailed geotechnical site investigations will be undertaken prior to construction to determine if any floating roads are required on sections of the internal road network.

All other access tracks will be constructed by excavating the existing ground to a competent stratum and building up with compacted stone to the required levels. A layer of compacted Cl 804 material will be placed on top to provide a suitable running surface. These access tracks will generally be constructed where the depth of peat / soft clay is shallow (less than 1m), where the vertical alignment is in cut or where the slope of the existing ground precludes the use of floating roads.

4.5.5.3 Hardstanding

A hardstanding area of approximately 40m x 77m with additional set down areas is detailed at each turbine location, as shown on the accompanying planning drawings (P1892-0400-0002). This area will accommodate a main crane and an assist crane during the assembly of the turbine, as well as during occasional maintenance during the operation of the wind farm. An area for the crane pad will also be required. The area of the hardstanding provided is deemed suitable for the assembly of a turbine with the dimensions proposed.

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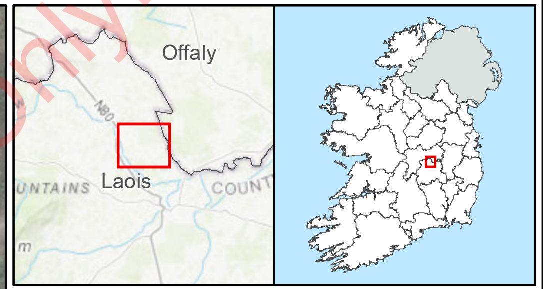

Proposed Turbines
Proposed Planning Boundary
Study Area Boundary
Proposed Cable Route
Proposed Turbine Hardstanding Areas
Proposed Substation
Proposed Temporary Compound

Proposed Access Tracks

Existing Track to be Upgraded
New Track

TITLE: Internal Access Tracks	
PROJECT: Dernacart Wind Farm	
FIGURE NO: 4.4	
CLIENT: Statkraft	
SCALE: 1:10000	**REVISION:** 0
DATE: 31/01/2020	**PAGE SIZE:** A3

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4.5.6 Watercourse Crossings

There are no new major watercourse crossings required within the proposed development site.

The existing crossings EXC1 over the Forrest Upper stream will be retained. It is proposed to widen the EXC1 to 5 m. A collector cable is proposed to be put in the access road over the culvert.

A Section 50 application will be required to obtain the prior consent of the Office of Public Works (OPW) for the design of the stream crossing at EXC1. Inland Fisheries Ireland will also be consulted at the detailed design stage.

4.5.6.1 Minor Watercourse Crossings

It is expected that all minor watercourse and drain crossings within the site will be crossed using piped culverts. Piped culverts will only be used over very short stretches i.e. at track crossings. Pipe culverts will be sized to take the 1 in 100-year flood flow with a 20% allowance for Climate Change. Concrete or HDPE pipes may be used depending on the size of the watercourse to be crossed.

Pipe culverts will be installed in accordance with the typical design shown in planning application drawing P1892-0400-0013.

For a typical minor watercourse/drain crossing using a piped culvert, the following outline methodology will be used.

- The access track construction will finish at least 10m from the nearside bank of the minor watercourse/drain.
- All environmental mitigation measures will be implemented locally in advance of the works, in accordance with the measures outlined in Section 4 of the CEMP in Appendix 4.2.
- Pipe culvert installation will only take place during dry periods.
- The bed of the watercourse will be prepared using a mechanical digger and hand tools to the required levels in accordance with the design.
- A bedding layer will be laid in the base of the minor watercourse/drain using Class 6 aggregate material and blinding to the desired levels in accordance with the design.
- The pipe is laid in one lift or in sections using a crane in accordance with an approved lift plan.
- Bedding material is placed and compacted around the pipe to the desired levels in accordance with the design.
- Where appropriate 500mm of suitable bedding material in the form of clean round gravel between 10-100mm diameter, shall be laid in the base of the pipe in accordance with the recommendations set out in *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Watercourses from* Inland Fisheries Ireland*.*
- The pipe is covered using compacted Class 6N fill material in accordance with the design up to the levels required by the access track sub formation.
- Rock armour headwalls will be constructed where necessary to protect pipe ends and the base of slope embankments on either side of the track.
- For small drain crossings, pipes of suitable diameter will be laid directly into the bed of the drain.

4.5.7 Temporary Site Facilities

Temporary welfare facilities within the site compound will be required during the construction and commissioning phase for site personnel. The location of the temporary site compound is shown on Figure 4.5. A wheel wash facility will be provided at the site entrance. The temporary facilities will be removed on completion of the construction phase.

Facilities to be provided in the temporary site compound will include the following:

- site offices, of Portacabin type construction
- portaloos
- car park
- bunded fuel storage

- drinking water supply
- a water tanker to supply water used for other purposes
- contractor lock-up facility
- diesel generator

The compound will also include the following:

- canteen facilities
- waste management areas
- storage areas

4.5.8 Meteorological Mast

A permanent meteorological mast is to be installed within the site. It will be a free-standing mast i.e. there with no guide wires. The foundation size will be ca. 10m x 10m x 2m.

Path: R:\Map Production\2018\P1892\Workspace\EIAR\Chapter 4 - Description of the Proposed Development\P1892_Fig4-5_TemporaryCompound_A3.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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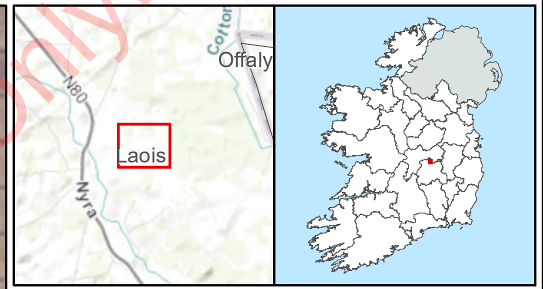

Proposed Turbines

Proposed Planning Boundary

Study Area Boundary

Proposed Turbine Hardstanding Areas

Proposed Temporary Compound

Proposed Access Tracks

New Track

TITLE: Temporary Compound	
PROJECT: Dernacart Wind Farm	
FIGURE NO: 4.5	
CLIENT: Statkraft	
SCALE: 1:2500	**REVISION:** 0
DATE: 31/01/2020	**PAGE SIZE:** A3

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4.5.9 Grid Connection

Connection will be sought from the grid system operators by application to either ESB Networks or Eirgrid. It is currently anticipated that the project will connect via underground cable to the future proposed Bracklone substation. The proposed grid connection is shown in Figure 4.6. No overhead lines are required for this connection. The Commission for Regulation of Utilities introduced a new grid connection policy in April 2018 to replace the older systems of Gates and non-GPA – the Enduring Connection Policy (ECP-1: 2018 Batch). The purpose of the ECP is to provide more frequent opportunities for projects to connect to the network. A subsequent batch is envisaged as soon as reasonably practical after ECP-1 has concluded.

The proposed cable route is along a local road on the eastern boundary of the site, joining the R423. The grid connection is then proposed to be laid along the R423 to Portarlington Golf Club. At Portarlington Golf Club, the grid route follows a local road to Kilbride. At Kilbride the grid route will follow local roads to the R420 and connect to the future proposed Bracklone substation.

EirGrid are currently progressing a planning application for the Bracklone substation, which is detailed in the current Transmission Forecast Statement. The applicant proposes to connect into this new substation. Planning permission for the grid connection will be sought under a separate application, but the connection and associated cable facilities are included within the scope of this EIAR.

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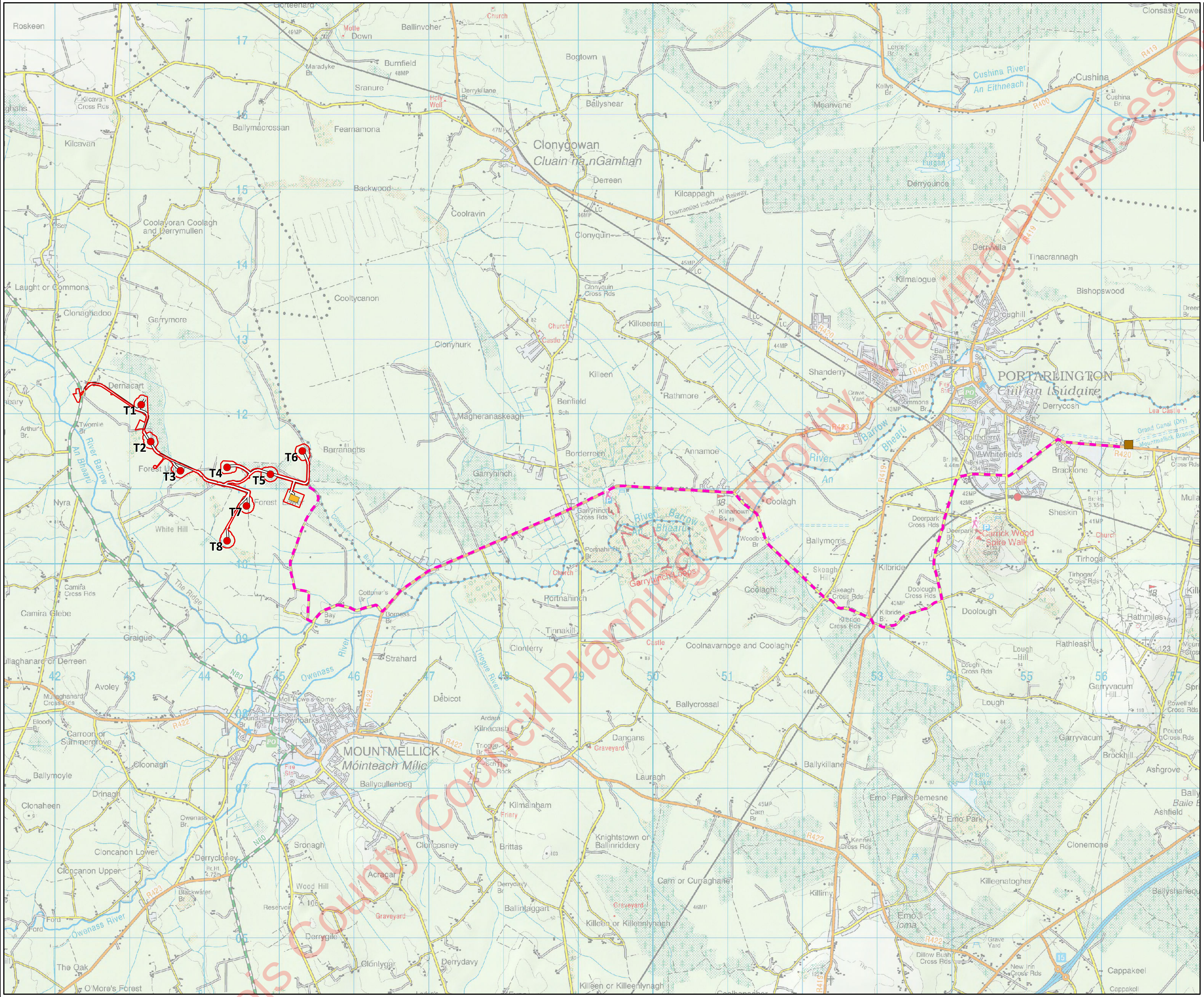

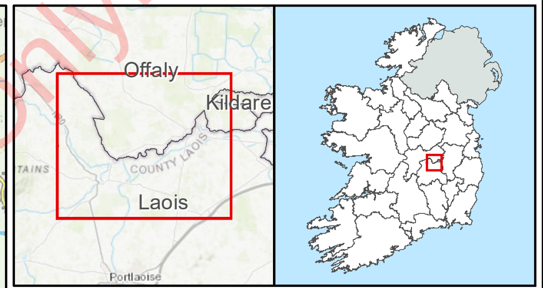

- Proposed Turbines
- Proposed Future Bracklone Substation
- Proposed Planning Boundary
- Proposed Grid Connection Route
- Proposed Access Tracks
- Proposed Substation

TITLE:	Grid Connection Route		
PROJECT:	Dernacart Wind Farm		
FIGURE NO:	4.6		
CLIENT:	Statkraft		
SCALE:	1:50000	**REVISION:**	0
DATE:	29/01/2020	**PAGE SIZE:**	A3

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0 1 2 4 Kilometers

4.5.9.1 Onsite Electricity Substation

It is proposed to construct 1 no. onsite electricity substation within the proposed development site as shown in Figure 4.7. This will provide a connection point between the wind farm and the proposed grid connection point at the proposed Bracklone substation.

The dimensions of the proposed substation compound will be approximately 128m x 80m and will include a substation control building and electrical components necessary to export the electricity generated from the wind farm to the national grid. The substation compound will be surrounded by an approximately 2.65 metre high steel palisade fence and internal fences will also be provided to segregate different areas within the main substation compound.

Lighting will be required on site and this will be provided by lighting poles located around the substation and exterior wall mounted lights on the control buildings.

One control building will be located within the substation compound. The control building will include the IPP and ESB control rooms, as well as an office space and welfare facilities for staff during the operational phase of the wind farm. Due to the nature of the project (i.e. estimated at approximately 2 staff during the operational stage) there will be a small water requirement for occasional toilet flushing/hand washing with a rainwater harvesting tank adjacent to the control building. A mains connection may be used as an alternative, if available.

A wastewater holding tank will be provided outside the substation compound fence line so that it can be maintained where required without requiring access to the substation compound. The wastewater holding tank will be a sealed storage tank with all wastewater tankered off site as and when required by an authorised waste collector to a wastewater treatment plant. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007, will be employed to transport wastewater away from the site. The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. The wastewater storage tank alarm will be part of a continuous stream of data from the site’s turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. This approach for managing wastewater on site has become standard practice on wind farm sites, which are often located in areas where finding the necessary percolation requirements for on-site treatment can be challenging and has been accepted by numerous Planning Authorities and An Bord Pleanála as an acceptable proposal. When the final destination of the wastewater is known (following the appointment of an authorised waste collector), this information will be made available be submitted to the Laois County Council where required.

Path: R:\Map Production\2018\P1892\Workspace\EIAR\Chapter 4 - Description of the Proposed Development\P1892_Fig4-7_On-siteSubstation_A3.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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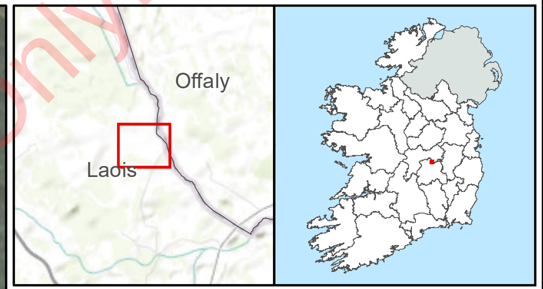

Proposed Turbines

Proposed Planning Boundary

Study Area Boundary

Proposed Cable Route

Proposed Turbine Hardstanding Areas

Proposed Substation

Proposed Access Tracks

Existing Track to be Upgraded

New Track

TITLE: On-site Substation	
PROJECT: Dernacart Wind Farm	
FIGURE NO: 4.7	
CLIENT: Statkraft	
SCALE: 1:2500	**REVISION:** 0
DATE: 29/01/2020	**PAGE SIZE:** A3

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4.5.9.2 Electrical Cabling

Underground electrical cables will connect the wind turbines to the proposed onsite substation at Dernacart which will then connect to the future proposed Bracklone substation. The proposed cable route from the proposed Dernacart onsite substation to the future proposed Bracklone substation is presented in Figure 4.6.

The electricity will be transmitted as a three-phase power supply so there will be three individual conductors (or individual cables) in each cable circuit. The three conductors will each be laid in separate ducts which will usually be laid in a trefoil formation but may also be laid in a flat formation. The final ducting arrangements will be detailed electrical engineers' design. The specification for the cables and cable-laying for the grid connection cabling will be in accordance with ESB requirements. A copy of the ESB requirements is provided in Appendix 4.3 of Volume 3 of this EIAR.

The typical width of a cable trench with a trefoil formation is 600mm, and a flat formation would require a wider trench width. The depth of cover to the ducts carrying the cables will usually be 950mm to the top of the upper duct in public roadways and grassed areas. The depth of trench for the cables will be approximately 1,220mm and the depth of cover for the 110kV cables will usually be 950mm. Cables laid within the wind farm site will be laid to a depth of up to 1,100mm to the top of the upper duct in field locations. The diameter of the ducting will be selected to suit the range of cross-sectional areas of electrical cables and is likely to fall between 100mm and 200mm diameter.

4.5.9.3 Cable Installation

The specifications for cables and cable installation will be in accordance with ESB requirements. Appendix 4.3 presents the ESB Standard Specification for Ducting/Cabling.

The following is a synopsis of the main activities for the installation of cabling:

- All relevant bodies i.e. ESB, Gas Networks Ireland, Eir, Laois and Offaly County Council, Irish Water etc. will be contacted and all drawings for all existing services will be sought.
- Immediately prior to construction taking place the area where excavations are planned will be surveyed and all existing services will be identified, and temporary warning signs erected where necessary.
- Clear and visible temporary safety signage will be erected all around the perimeter of the live work area to visibly warn members of the public of the hazards of ongoing construction works.
- A 13 tonne rubber tracked 360-degree excavator will be used to excavate the trench to the dimensions of approximately 600mm wide by approximately 1.2m deep.
- Any ingress of ground water will be removed from the trench using submersible pumps and pumped to the nearest available existing drainage channel.
- A silt filtration system will be installed on all existing drainage channels for the duration of the cable construction to prevent contamination of any watercourse.
- Once the trench has been excavated, and up to 50mm depth base layer of sand (in road trench) or 15 Newton CGBM B concrete (off road trench) will be installed and compacted. All concrete will be offloaded directly from the concrete truck into the trench.
- PVC ducts will be installed on top of the compacted base layer material in the trench.
- Once the ducts have been installed, couplers will be fitted and capped to prevent any dirt etc. entering the unjointed open end of the duct. In poor ground conditions, the open end of the duct will be shimmed up off the bed of the trench to prevent any possible ingress of water and dirt into the duct. The shims will be removed once the next length of duct has been joined to the duct system.
- The as-built location of the installed ducts will be surveyed and recorded using a total station/GPS before the trench is backfilled to ensure recording of exact location of the ducts, and hence the operational electricity cable. These co-ordinates will be plotted on as-built record drawings for the grid connection cable operational phase.
- When ducts have been installed in the correct position on the trench base layer, sand (in road trench) or Lean-mix CBM4 (CL1093) (off road trench) will be carefully installed in the trench around the ducts so as not to displace the duct and compacted.
- Spacer templates will be used during installation to ensure that the correct cover of duct surround material is achieved above, below and at the sides of the duct in the trench.

- A red cable protection strip will be installed above duct surround layer of material and for the full length of the cable route.
- A layer of Lean-mix CBM4 (CL1093) (in road) or excavated material (off road) will be installed on top of the duct surround material to a level 300mm below the finished surface level.
- Yellow marker warning tape will be installed for the full width of the trench, and for the full length of the cable route, 300mm from the finished surface level.
- The finished surface of the road, road verge, or agricultural land will be reinstated as per its original condition or to the requirements of the Laois Area Engineer.
- Precast concrete cable joint bays will be installed within the excavated trench. The cable joint bays are backfilled and the finished surface above the joint bay reinstated as per its original condition. The cable joint bays are re-excavated a second time during cable pulling and jointing, after which the finished surface above the joint bays is reinstated again to its original condition.
- When trenching and ducting is complete, the installation of the grid connection cable will commence between the wind farm onsite sub-station to the proposed Bracklone substation.
- Construction work areas and traffic management measures will be setup at 2 no. consecutive cable joint bays simultaneously. The underground cable will be pulled through the installed ducts from a cable drum set up at one joint bay and using a winch system which is set up at the next joint bay, the cable is pulled through.
- The cables are jointed within the precast concrete cable joint bays.
- The finished surface above each cable joint bay is reinstated to its original condition, and the construction work area removed.

For simplicity, each cable circuit is referred to as a cable in the remainder of this document.

<u>Water-Course Crossings</u>

As part of the grid connection route, a number of watercourses will need to be crossed. Structures such as those set out below will be crossed via directional drilling (unless otherwise agreed with the local authority) along the route as follows:

- Culvert over the Forrest lower stream, tributary of the Cottoner's Brook stream
- Culvert over White(W) Hill stream, tributary of the River Barrow
- Culvert/Arch Bridge over White(W) Hill stream, tributary of the River Barrow
- Bridge over Cottoner's Brook stream, tributary of the River Barrow
- Bridge over Clonygowan stream, tributary of the River Barrow
- Bridge over Unknown stream, tributary of the River Barrow
- Bridge over Rathmore stream, tributary of the River Barrow
- Bridge over River Barrow

No instream works are anticipated because the proposed method of crossing is horizontal directional drilling (HDD) within the road corridor with 'Clear bore' drilling fluid.

For the crossing of culverts, if encountered, the following options for construction may be used:

- Piped Culvert Crossings – Where sufficient cover is available, the cable ducts will be laid above the culvert with a minimum separation distance, typically 300mm to be agreed with the local authority and ESBN.
- Piped Culvert Crossings - Where sufficient cover is not available, the cable ducts will be laid under the culvert with a minimum separation distance, typically 300mm to be agreed with the local authority and ESBN.

  Flatbed Formation over Culverts - where the cable duct is to be installed over an existing culvert where sufficient cover is not available, the ducts will be laid in a much shallower trench the depth of which will be determined by the location of the top of the culvert. The duct will be laid in this trench in a flatbed formation over the existing culvert and will be encased in 6mm thick steel galvanized plate with a 30N concrete surround as per ESB Networks specification.

4.5.9.4 Joint Bays

Joint bays are pre-cast concrete chambers where individual lengths of cables are joined to form one continuous cable. As part of the detailed design, joint bay locations will be selected to maximise the lengths of cables, following consideration of cable detailed design issues, the space requirements for cable drums and cable pulling equipment as well as the impact on local residents and road users. The joint bays will be located at various points along the ducting route at approximately 500m – 1,000m intervals or as otherwise required by ESB requirements.

A joint bay will be constructed in a pit. The bay typically will be approximately 4.5m x 1.8m x 1.2m deep. A reinforced concrete slab will be constructed in the bay to accommodate the jointing enclosure.

Communication chambers, which are similar to small manholes, will also be installed at the joint bay locations to facilitate connection of fibre-optic communication cables.

4.5.9.5 Traffic Management

A careful approach will be taken to planning the works to ensure minimal impacts on road users and the general public. Where the road is wide enough construction will be undertaken while maintaining the opening of one lane. In these locations, detailed traffic management plans will be put in place, in consultation with Laois and Offaly County Councils, to provide a safe environment for road users and construction workers.

On narrower roads it will be necessary to shut the road. Road closures will be subject to the applicable statutory processes as implemented by the roads authority. Road closures will be facilitated by the good network of roads in the area. 'Rolling road closures' will be implemented, whereby the site will progress each day along a road, which will have the effect of reducing the impact for local residents.

An outline Traffic Management Plan is contained in the Construction Environmental Management Plan (CEMP) which is included in Appendix 4.2 of Volume 3. The Traffic Management Plan shall be finalised following the appointment of the contractor for the main construction works.

4.5.10 Peat Management

As there will be a surplus of peat due to excavations, berms have been incorporated into the design along the access tracks and turbine basis. These are illustrated in the accompanying planning drawings (Series P1892-0100). Refer to Chapter 13, Land, Soils and Geology for further information on peat depths and slopes within the site.

4.5.11 Drainage

The drainage system will be constructed alongside all turbines, internal access tracks, hardstands, substation and the temporary construction compound. The drainage system for the existing tracks and roads will largely be retained. Where the roads require widening, this will involve the slight re-location of existing roadside swales to allow for widening. Further details on the hydrology and drainage are contained in Chapter 14 Hydrology and Water quality, in the CEMP in Appendix 4.2 and in the Planning Drawings.

4.5.12 Tree Felling

An area of the proposed development site comprises of commercial coniferous forestry. Felling of approximately 18ha of coniferous forestry is required within and around the wind farm infrastructure to accommodate the construction of some turbines, hardstands, crane pads, access tracks and the proposed onsite substation. Turbines 1, 3, 4, 5 and 6 are located within forestry and consequently tree felling will be required as part of the project.

It is proposed to fell approximately 18ha of coniferous forestry for the proposed development, which will be the subject of a Felling Licence Application to the Forest Service prior to construction as per the Forest Service's policy on granting felling licenses for wind farm developments. The proposed areas to be felled are illustrated on Figure 4.8.

The Forest Service Policy requires that a copy of the planning permission for the wind farm be submitted with a felling licence application therefore the felling licence cannot be applied for until planning permission is received for the proposed development site. The licence will include the provision of relevant replant lands to be planted in lieu of the proposed tree felling on the site. It should be noted that the forestry within the proposed wind farm site was originally planted as a commercial crop and will be felled in the coming years should the wind farm proceed or not.

To ensure a tree clearance method that reduces the potential for sediment and nutrient runoff, the construction methodology will follow the specifications set out in the Forest Service Forestry and Water Quality Guidelines (2000) and Forest Harvesting and Environmental Guidelines (2000).

Before any harvesting works commence on site all personnel, particularly machine operators, will be made aware of the following and will have copies of relevant documentation, including:

- the felling plan, surface water management, construction management, emergency plans and any contingency plans;
- environmental issues relating to the site;
- the outer perimeter of all buffer and exclusion zones;
- all health & safety issues relating to the site.

The tree felling required around infrastructure will be limited to:

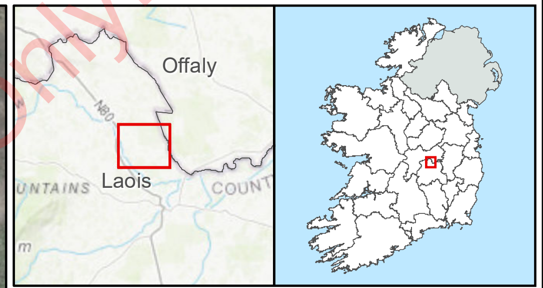
- 90m radius around each turbine located in forestry
- 20m wide corridors for access tracks
- 10m buffer surrounding the substation
- 10m buffer surrounding the hardstanding
- Felling as part of bat buffers

4.5.13 Replant Lands

Replacement replanting of forestry can occur in Ireland subject to licence in compliance with the Forestry Act 1946 as amended. The consent for such replanting is covered by statutory instrument (S.I.) 558 of 2010 European Communities (Forest Consent and Assessment) Regulations 2010 as amended. This legislation provides for development of afforestation and forest road construction projects which require adherence to and compliance with the Environmental Impact Directive (85/337/EEC) if the afforestation is likely to have a significant effect on the environment, insofar as it applies to forestry development.

As it is proposed to fell approximately 18ha of coniferous forestry for the proposed Dernacart Wind Farm development, replant lands of the same area are required. The replacement replanting of forestry can occur anywhere in the State subject to licence. A potential replanting site has been identified at Carrigthomas, Co. Cork. The total area available for afforestation is 23.99ha which is subject to Forest Service Technical Approval for afforestation. If these replant lands become unavailable, other Forest Service technically approved lands will be used for replanting should the proposed wind farm receive planning permission.

Appendix 4.4 of this EIAR presents an environmental assessment of these replant lands.



- Proposed Turbines
- Proposed Planning Boundary
- Proposed Tree Felling Areas
- Proposed Turbine Hardstanding Areas
- Proposed Substation
- Proposed Temporary Compound

Proposed Access Tracks

- Existing Track to be Upgraded
- New Track

TITLE: Tree Felling Locations	
PROJECT: Dernacart Wind Farm	
FIGURE NO: 4.8	
CLIENT: Statkraft	
SCALE: 1:10000	**REVISION:** 0
DATE: 30/01/2020	**PAGE SIZE:** A3

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4.6 Wind Farms in the Surrounding Area

There are 3 no. of wind farms in the surrounding area. Figure 4.9 illustrates the wind farm within 20km of the site. The wind farms within 20km are Mount Lucas (existing), Cloncreen (permitted) and Moanvane (permitted).

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Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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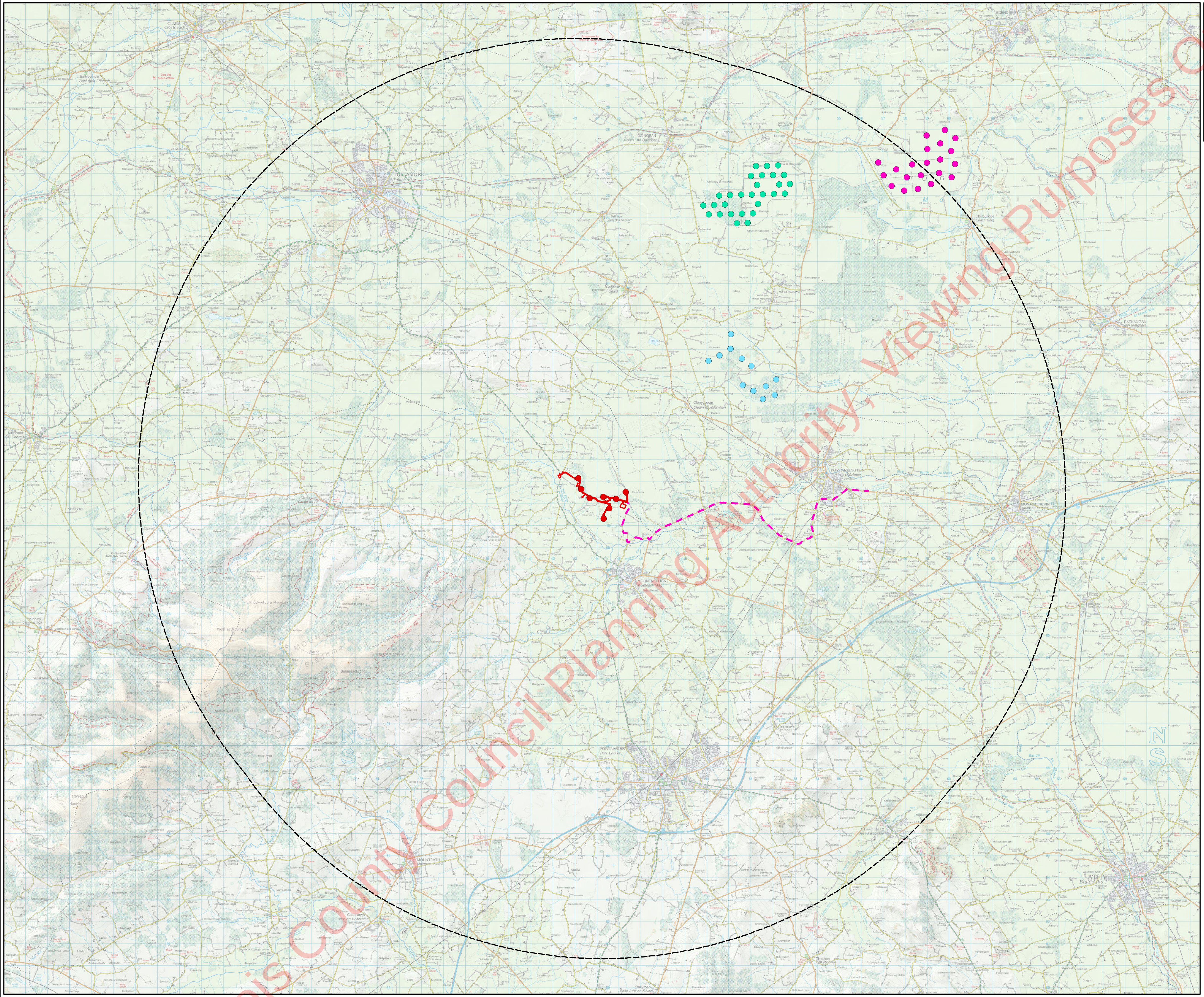

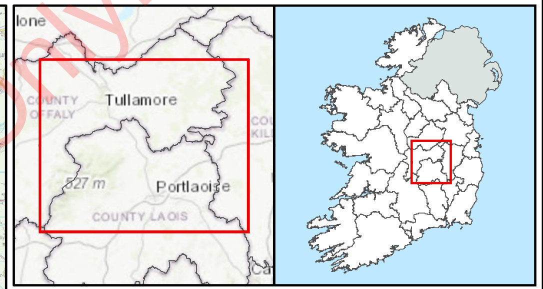

Proposed Turbines

20km Distance from Turbines

Proposed Planning Boundary

Proposed Cable Route

Wind Farms in the Vicinity of the Proposed Development

Mountlucas, Existing

Cloncreen, Permitted

Moanvane, Permitted

TITLE: Wind Farms in the Vicinity of the Proposed Development	
PROJECT: Dernacart Wind Farm	
FIGURE NO: 4.9	
CLIENT: Statkraft	
SCALE: 1:170000	**REVISION:** 0
DATE: 29/01/2020	**PAGE SIZE:** A3

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4.7 Project Construction

A Construction and Environmental Management Plan (CEMP) is contained in Appendix 4.2 of Volume 3.

The Construction and Environmental Management Plan sets out the key environmental management and mitigation measures associated with the construction, operation and decommissioning of the proposed wind farm, to ensure that during these phases of the development, the environment is protected, and any potential impacts are minimised. The final CEMP will be developed further at the construction stage, on the appointment of the main contractor to the project. The main contractor will be committed to implementing the mitigation measures committed to in this EIAR including those contained in the CEMP.

4.7.1 Construction Activities

In the event that the Planning Authority decides to grant planning permission for the proposed development, tree felling, upgrading of existing site tracks and the provision of new site tracks are expected to precede all other activities. Drainage infrastructure will be constructed in parallel with the track construction. This will be followed by the construction of the turbine foundations and the provision of the hardstanding areas. In parallel with these works the on-site electrical works; sub-station and internal cable network and off-site connection works to the national grid will be completed. An outline of construction techniques is contained in the CEMP in Appendix 4.2.

4.7.2 Site access tracks and Drainage

Access tracks are required to facilitate the construction of the proposed wind farm and to provide access to each of the turbines. Drainage infrastructure will be constructed in parallel with the access track construction.

4.7.3 Onsite Substation

The compound will include a substation building. The building's main functions is to provide housing for switchgear, control equipment and monitoring equipment necessary for the proper functioning of the substation and wind farm. The building will be constructed by the following methodology:

- The area of the control buildings and compound will be marked out using ranging rods or wooden posts and the vegetable soil stripped and removed to the nearby storage area for later use in landscaping. No material will be removed from site and storage areas will be stripped of vegetation prior to stockpiling in line with best working practises.
- Drainage runs and associated settlement ponds will be installed.
- The dimensions of the Building and Compound area will be set to meet the requirements of EirGrid/ ESB and the necessary equipment to safely and efficiently operate the wind farm.
- The foundations will be excavated down to the level indicated by the designer and concreted.
- The blockwork walls will be built up from the footings to DPC level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors.
- The blockwork will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the building for this operation.
- The concrete roof slabs will be lifted into position using an adequately sized mobile crane.
- The roof trusses will be lifted into position using a telescopic load all or mobile crane depending on site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather.

The remainder of the substation compound will be brought up to the agreed formation and approved stone imported and graded to the correct level as per the detail design.

Equipment plinths will be marked out, excavated and constructed using in-situ reinforced concrete or pre-cast concrete. Provision will be made in each plinth for earth connection.

Following the construction of the equipment plinths an earth mat will be installed throughout the compound. This will be connected to each plinth and the buildings as per the electrical earth protection design.

4.7.3.1 Electrical Works

Substation Fit Out and Switchgear Installation

The substation will have a domestic electrical system including lights, sockets, fire alarm and intruder alarm. The high voltage switchgear is typically installed through the following method.

- The switchboard units are delivered to site on a truck and unloaded using a forklift, front end loader or HIAB crane.
- Suitable task specific RAMS and lifting plans will be in place prior to the commencement of all works.
- The switchgear will be unloaded on to a concrete plinth directly outside the substation building.
- The units will be moved inside the substation building using a hand driven forklift and positioned over the internal trench supports, prepared previously.
- The switchgear is then secured as per manufacturer's instructions, typically by bolting directly to steel support bars over the trench.
- The building is fitted out with small light and power and ancillary wind farm control equipment such as SCADA computer, remote telemetry units, metering etc.

All equipment and fittings are then connected, wired tested and commissioned in accordance with the Electrical Contractor's commissioning plan.

The equipment will be decommissioned in the reverse of the above, removed from site, dismantled and disposed of in an approved manner.

Transformers

- The turbine transformers will be placed directly onto the turbine foundation upon delivery to site, prior to the installation of the turbine towers. Alternatively, the transformers may be located in the turbine nacelle, subject to turbine supply contract.
- The transformers will be of the sealed type and will be inspected for any damage prior to offloading. It is likely that the units will be installed using a small mobile all-terrain crane and will be tested, commissioned and energised by suitably trained and authorised persons.
- The accessible sections of the transformer will be protected within an enclosure which shall be locked at all times displaying appropriate warning signs. The units will be decommissioned in the same manner, removed from site and disposed of by a company certified to handle such materials. This specialist company will also dispose of any oil or residual waste products.
- Transformers and ancillary plinth-mounted equipment required in the substation compound will be delivered to site and unloaded directly in place by HIAB crane or similar.
- Suitable task specific RAMS and lifting plans will be in place prior to the commencement of all works and adequate hard standings will be provided prior to delivery to facilitate safe unloading.

4.7.4 Cable Trenches

The proposed cable route is indicated in Figure 4.6. Records of services such as watermains, sewers, gas mains and other power cables will be obtained from the relevant service providers. Cable detection tools, ground penetrating radar and slit trenches will be used, as appropriate, to find the exact locations of existing services. The final locations of the cable routes in the public roads and in the verge along the public road will be selected to minimise conflicts with other services. It is desirable that a minimum separation distance of 300mm will be maintained with existing services. Usually the new cables will be laid below existing services.

Initially the contractor will excavate cable trenches and then lay high density polyethylene (HDPE) ducting in the trench in a surround of CBM (cement bound material). A rope will be inserted into the ducts to facilitate cable-pulling later. The as-constructed detail of the cable duct locations will be carefully recorded. Cable marker strips will be placed 75mm above the ducts and the two communication ducts will also be laid. An additional layer of cable marker strips will be laid above the communication ducts and the trench back-filled. Back-filling and reinstatement in public roads will be to a specification to be agreed with the road authority.

A similar construction methodology will apply for cable trenches laid within site access tracks. In this case the cable-ducts will generally be laid when the track is being constructed and will follow the edge of the site access tracks. The trenches within these locations will generally be backfilled using the excavated material.

Plate 4-1: Cable Laying, Trefoil Configuration

4.7.5 Turbine Hardstands

A turbine hardstanding area (refer to planning drawing P1892-0400-0002) will be constructed at the base of each turbine to provide a solid area for the main installation crane that will be used to erect the turbine and for the assembly of the turbine. Turbine hardstands will be constructed to turbine supplier specifications.

Turbine Foundation

The base of the foundations are excavated to competent bearing strata or where this depth is excessive piling may be required. This will be determined following the detailed site investigation at pre-construction stage. Turbine foundation to be constructed to turbine supplier specifications.

Excavated soil will be placed in the temporary storage areas adjacent to the turbines. Formwork and reinforcement are placed, and the concrete poured. Once the concrete is set the earthing system is put in place and the foundation is backfilled with suitable material.

4.7.6 Turbine Erection

Once the turbine components arrive on site they will be placed on the hardstand and lay down areas prior to assembly. The towers will be delivered in sections and each blade will be delivered in a separate delivery. Once there is a suitable weather window the turbine will be assembled.

It is anticipated that each turbine will take approximately 3 to 4 days to erect (depending on the weather), requiring two cranes. Finally, the turbines will be commissioned and tested.

It is expected that the construction phase, including civil electrical, grid works, and turbine assembly will take between approximately 12 months.

4.7.7 Waste Disposal

It will be the objective of the Developer in conjunction with appointed contractor to prevent, reduce, reuse and recover as much of the waste generated on site as practicable and to ensure the appropriate transport and disposal of residual waste off site. This is in line with the relevant National Waste Management Guidelines and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended.

Any waste generated during the development construction phase will be collected, source separated and stored in dedicated receptacles at the temporary compound during construction. It will be the responsibility of the contractor for the main construction works (when appointed) to nominate a suitable site representative such as a Project Manager, Site Manager or Site Engineer as Waste Manager who will have overall responsibility for the management of waste. The waste manager will have overall responsibility to instruct all site personnel including sub-contractors to comply with on-site requirements. They will ensure that at an operational level that each crew foreman is assigned direct responsibility.

Waste Generated

It is envisaged that the following categories of waste will be generated during the construction of the project:

- municipal solid waste (MSW) from the office and canteen
- construction and demolition waste
- waste oil/hydrocarbons
- paper/cardboard
- timber
- plastics
- steel

A fully authorised waste management contractor will be appointed prior to construction works commencing. This contractor will provide appropriate receptacles for the collection of the various waste streams and will ensure the regular emptying/and or collection of these receptacles.

Waste Minimisation/Reduction

All efforts will be made by site management to minimise the creation of waste throughout the project. This will be done by:

- material ordering will be optimised to ensure only the necessary quantities of materials are delivered to site;
- material storage areas will be of a suitable design and construction to adequately protect all sorted materials to ensure no unnecessary spoilage of materials occurs which would generate additional waste;
- all plant will be serviced before arriving on site. This will reduce the risk of breakdown and the possible generation of waste oil/hydrocarbons on site;
- all operators will be instructed in measures to cut back on the amount of wastage for trimming of materials etc. for example cutting of plywood, built into the amount ordered;
- educating foremen and others to cut/use materials such as ply wisely for shutters etc.;
- prefabrication of design elements will be used where suitable to eliminate waste generation on site;
- where materials such as concrete are being ordered, great care will be practiced in the calculation of quantities to reduce wastage.

Reuse

When possible, materials shall be re used onsite for other suitable purposes e.g.:

- re-use of shuttering etc. where it is safe to do so;
- re-use of rebar cut-offs where suitable;
- re-use of excavated materials for screening, berms etc.;
- re-use of excavated material etc. – where possible will be used as suitable fill elsewhere on site for site tracks, the hardstanding areas and embankments where possible.

It is important to clarify that any excess excavated material that will be used for fill, re-instatement, or similar activities, within the development site boundary is not technically categorised as a waste material under relevant waste legislation, rather this material is exempt from waste classification.

Article 2 (1) (c) of Directive 2008/98/EC on waste, transposed through Article 26 (1) (c) of the European Communities (Waste Directive) Regulations (S.I. 126 of 2011) identifies the following as being an exemption from waste regulation:

> *"uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated".*

It is envisaged that surplus material will be re-instated in its natural condition on the site from which it was excavated, this material is not considered as waste.

Waste Recycling, Recovery & Disposal

In accordance with national waste policy, source separation of recyclable material will take place. This will include the provision of receptacles for the separation and collection of dry recyclables (paper, cardboard, plastics etc.), biological waste (canteen waste) and residual waste.

Receptacles will be clearly labelled, signposted and stored in dedicated areas.

The following sourced segregated materials container will be made available on site at a suitable location:

- timber;
- ferrous metals;
- aluminium;
- dry mixed recyclables;
- packaging waste;
- food waste.

The materials will be transported off-site by an authorised contractor to a permitted recovery centre and these materials will be processed through various recovery operations.

Residual waste generated on-site may require disposal. This waste will be deposited in dedicated receptacles and collected by the permitted waste management contractor and transported to an appropriate facility. All waste movements will be recorded, and records will be held by the waste manager on-site.

4.8 Operation and Lifespan

During the operational period, the turbines will operate automatically on a day to day basis, responding by means of anemometry equipment and control systems to changes in wind speed and direction. The turbine manufacturer or a service company will carry out regular maintenance of the turbines.

Scheduled maintenance will typically occur twice a year. The operation of the wind turbines will be monitored remotely, and a caretaker will oversee the day to day running of the proposed wind farm.

The expected physical lifetime of the turbine is approximately 30 years, and permission is sought for a **30-year operation period** commencing from full operational commissioning of the wind farm. It should be noted that section 7.2 of the Planning Guidelines 2006 includes for the following:

'The inclusion of a condition which limits the life span of a wind energy development should be avoided, except in exceptional circumstances'

In this respect, the applicant requests the grant of permission is on the basis of a **30-year operational period from the date of full operational commissioning of the wind farm.**

With longer permitted operational period, the lower the cost will be, and the better the competitiveness of the wind farm with other electricity generators.

4.9 Decommissioning

Following the end of their useful life, the wind turbines subject to planning permission may be replaced with a new set of turbines or the site may be decommissioned. On decommissioning, cranes will disassemble the above ground turbine components which would be removed off site for recycling. All the major component parts are bolted together, so this is a relatively straightforward process. The foundations will be covered over and allowed to re-vegetate naturally if required. Leaving the turbine foundations in situ is considered a more environmentally sensible option as to remove the reinforced concrete associated with each turbine would result in environmental nuisances such as noise and vibration and dust. It is proposed that the internal site access tracks may be left in place, subject to agreement with Laois County Council and the relevant landowners.

The substation will remain in place as it will be under the ownership of the EirGrid.

Underground cables will be cut back and left in place.

A decommissioning plan will be agreed in advance of construction with Laois County Council. A decommissioning plan is contained in the CEMP in Appendix 4.2 of Volume 3.